# Levels and Diagnostic Value of Model-based Insulin Sensitivity in Sepsis: A Preliminary Study

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INDIAN JOURNAL OF CRITICAL CARE MEDICINE
**Volume:** 22 **Issue:** 6 **Pages:** 402-407
**DOI:** 10.4103/ijccm.IJCCM_92_18
**Published:** JUN 2018
**Document Type:** Article

## Abstract

Background and Aims: Currently, there is a lack of real-time metric with high sensitivity and specificity to diagnose sepsis. Insulin sensitivity (SI) may be determined in real-time using mathematical glucose-insulin models; however, its effectiveness as a diagnostic test of sepsis is unknown. Our aims were to determine the levels and diagnostic value of model-based SI for identification of sepsis in critically ill patients. Materials and Methods: In this retrospective, cohort study, we analyzed SI levels in septic (n = 18) and nonseptic (n = 20) patients at 1 (baseline), 4, 8, 12, 16, 20, and 24 h of their Intensive Care Unit admission. Patients with diabetes mellitus Type I or Type II were excluded from the study. The SI levels were derived by fitting the blood glucose levels, insulin infusion and glucose input rates into the Intensive Control of Insulin-Nutrition-Glucose model. Results: The median SI levels were significantly lower in the sepsis than in the nonsepsis at all follow-up time points. The areas under the receiver operating characteristic curve of the model-based SI at baseline for discriminating sepsis from nonsepsis was 0.814 (95% confidence interval, 0.675-0.953). The optimal cutoff point of the SI test was 1.573 x 10(-4) L/mu/min. At this cutoff point, the sensitivity was 77.8%, specificity was 75%, positive predictive value was 73.7%, and negative predictive value was 78.9%. Conclusions: Model-based SI ruled in and ruled out sepsis with fairly high sensitivity and specificity in our critically ill nondiabetic patients. These findings can be used as a foundation for further, prospective investigation in this area.

## Keywords

**Author Keywords:** Critical care; diagnosis; insulin sensitivity; model-based; sepsis
**KeyWords Plus:** CRITICALLY-ILL; METABOLISM; RESISTANCE; GLUCOSE; ENDOTOXEMIA; GLYCEMIA

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### Publisher

WOLTERS KLUWER MEDKNOW PUBLICATIONS, WOLTERS KLUWER INDIA PVT LTD , A-202, 2ND FLR, QUBE, C T S NO 1498A-2 VILLAGE MAROL, ANDHERI EAST, MUMBAI, 400059, INDIA

### Categories / Classification

**Research Areas:** General & Internal Medicine

**Web of Science Categories:** Critical Care Medicine

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